given free meals, and already there are demands that they shall be clothed at the expense of the ratepayers, and that the parents shall even be paid for providing them with lodging. It is not impossible that before long these demands will be conceded by either party in the State. The heavy additional expense incurred in this policy falls upon the middle-class ratepayers and taxpayers, who have to feed, educate, and clothe their own children at their own expense. It may be said that they can get free education for their children by sending them to the State schools; but this is to level down instead of to level up; for if they do so, they will be lowering the general morale of their own class, the most priceless asset of the nation. The heavy burden of taxation entailed by this policy, falling as it does with special weight on the middle classes, renders it more difficult each year for the young men and the young women in that class to marry before thirty, for they naturally shrink from the expense of bringing up large or even moderate-sized families. We need not then wonder at the falling-off in the rate of increase of the middle classes. Our legislators are bad stockmasters, for they are selecting to continue the race the most unfit physically and morally, whilst they discourage more and more the increase of what we have proved to be the outcome of a long process of natural selection. The present policy therefore tends to reduce that which in all ages has been the mainstay of every State, the middle class. The yeomen of England, the free burghers of Germany and of Italy, formed the best element in the Middle Ages. So was it also with the great republics of the ancient world. Aristotle, in more than one passage, has pointed out that the middle class, that which stands between the "excessively wealthy" and the "very poor," between the "millionaire" and the "wastrel," are the mainstay of every State, and he shows that, where the middle class has been crushed out by the millionaire or the mob, ruin has inevitably overtaken the State. Indeed, it is clear that the chief defect in the Greek democracies was the smallness and weakness of the middle class, whilst it is notorious that Rome prospered only so long as the middle-class citizens flourished. Her downfall came when they were extinguished by the great capitalists, who made common cause with the masses against them. The latter had no patriotism, were incapable of bearing arms, and had no aspirations beyond free meals and popular entertainments at the expense of the State.

It is of great scientific interest to discover how the short-skulled peoples of Asia and Europe became differentiated from their long-skulled congeners; it is of great practical importance to apply to the administration of our great dependencies and colonies the lessons taught by anthropology; but it is infinitely more important to maintain a vigorous stock of citizens for the kingdom and the empire. Questions of the origin of races are, after all, only academic; but the other two, more especially the last, are intimately bound up with the life of the nation. If the present policy of our legislators is adhered to, the moral and the physical standard of the British citizen will steadily deteriorate, for the population will gradually come to consist of the posterity of those who are themselves sprung from many generations of the most unfit. Should this unfortunately come to pass, it will be the result of human pride refusing to apply to the human race the laws which inexorably regulate all Nature.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

ST. ANDREWS.—Dr. Hugh Marshall has been appointed successor to Prof. James Walker, F.R.S., in the chair of chemistry in University College, Dundee, and Dr. Percy J. Herring has been appointed to the Chandos chair of physiology in the United College, St. Andrews, in the room of the late Prof. Pettigrew, F.R.S.

MR. T. J. REES has been appointed superintendent of education for the borough of Swansea.

THE directorship of the research hospital of the Rockefeller Institute of New York City has been accepted by Prof. Rufus I. Cole, of the Johns Hopkins University.

MR. J. A. GILRUTH, chief veterinarian and Government bacteriologist of New Zealand, has been appointed director of the National Veterinary College and Research Institute now being established by the Government of Victoria, Australia.

A COURSE of public lectures on hygiene and public health has been arranged (in cooperation with the State Department of Health) for delivery at Cornell University. The introductory lecture will be given on October 8 by President Schurman.

THE *Times* reports that Prof. Borgman has resigned the rectorship of St. Petersburg University as a protest against the policy of the Minister of Education; it also says that the Council of Ministers has empowered the Minister of Public Instruction to forbid women to attend university lectures in future, but to permit those to complete their studies at universities who have already received permission, and whose transfer to higher educational institutions for women is impossible.

THE Royal Agricultural College, Cirencester, after an existence of sixty-three years, has been re-organised, that its sphere of activity and usefulness may be greatly widened, and that it may no longer be handicapped by non-eligibility to receive grants from public monies. Taking advantage of the enlarged powers now conferred upon it, the college proposes to advance the cause of agriculture in general, and the agricultural interests of the west of England in particular, by actively engaging in the following kinds of work:—(1) scientific research in agricultural subjects; (2) cooperation with the University of Bristol (by which it will, no doubt, be fully recognised) in the establishment of degree courses and degrees in agriculture and forestry; (3) continuance of the important work of training landowners, estate agents, and colonists; (4) training county scholars in agriculture; (5) continuing and extending the system of short courses for sons of tenant farmers; (6) establishing classes in subjects of rural education for the benefit of teachers; (7) cooperation with county councils in their instructional and experimental work; (8) acting as a bureau of information for the benefit of west of England agriculturists.

THE new session of the Birkbeck College, London, will be opened on September 28 with an address by Dr. Albert Griffiths. The new calendar, which is now available, shows that the college provides courses of day and evening instruction for degrees in arts, science, laws, and economics in the University of London, in addition to other important educational work. Twenty-eight members of the large staff are recognised teachers of the University of London. The work of the college has developed so greatly in recent years that there is pressing need for increased space. In some departments the stage has been reached where students have to be refused, and the usefulness of the college is curtailed by its limited accommodation. There is, in fact, urgent need for more spacious college buildings. We commend this calendar to intending students who live within access of the college as being likely to provide information of the kind they seek. The calendar of the Bradford Technical College for 1908–9, issued by the education committee of the city, has also been received. It not only provides full information of the comprehensive day and evening courses in technology provided at the Technical College, but also of an efficient department for external examination work, such as that in connection with the Board of Education and the Pharmaceutical Society. The volume concludes with particulars of the evening continuation schools and the branch technical and commercial schools provided throughout the city.

FROM time to time during the past six months handsome bequests to assist the development of higher education in the United States have been announced in *Science*. In addition to many gifts of 10,000*l.* or less, the following benefactions have been made. By the will of the late Mrs. Frederick Sheldon, 60,000*l.* has come to Harvard

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University, and the amount will be increased eventually to something like 160,000*l.*; and the same university has also received from its class of '83 the sum of 20,000*l.* Princeton University has announced a gift of 50,000*l.* from Mrs. Russell Sage, and the University of Virginia received the same amount by the will of the late Mr. E. W. James. Mr. Andrew Carnegie has given 40,000*l.* to the Mechanics Institute of New York City and 20,000*l.* to Rochester University. The Hampden Agricultural School obtained 32,000*l.* by the will of the late Miss Alice Byington, and from that of the late Mr. Warren D. Potter the Massachusetts College of Pharmacy has benefited to the extent of 30,000*l.* The children of the late Rev. Orlando Harriman have presented 20,000*l.* to Columbia University, and Yale University has received 15,000*l.* by the will of the late Mr. G. B. Griggs. There would not appear to be any falling off in the enthusiasm shown for higher education by wealthy Americans, who continue to be fully alive to the need for well-endowed colleges throughout the States in order to fit American citizens to hold their own in the ever-increasing industrial competition.

Lord Rosebery opened the new engineering laboratories of the Heriot-Watt College, Edinburgh, on September 16, and delivered an inspiring address, in which he reviewed the history of the college and emphasised the value of technical training. After reminding the audience that Sir Walter Scott once said it was, in his opinion, as great a crime to hide knowledge from the people as it would be to hide the sun from them if we had the power, Lord Rosebery pointed out that the Heriot-Watt College was one of the first institutions founded in Great Britain for the express purpose of giving evening instruction to artisans, and it was the parent of all the mechanics' institutes and polytechnics that now are so rife and so much used throughout the country. It began by teaching only the principles of mechanics and chemistry and other branches of science of practical application to the several trades in Edinburgh. Now it works with the University, and gives what is practically extra-mural teaching, and while training in the evening classes corresponds to that given in the trade and commercial schools in Germany, the day college is doing the work which is done in the technical universities of Germany. Referring to the work of the day students, Lord Rosebery had something to say to employers of labour. If the number of day students could be multiplied, and if it were found possible for employers to give their apprentices days for study, besides the evenings that apprentices furnish for themselves, both the students and the employer would find their reward. If the college is ever to receive its full development, that fact will have to be recognised, and the number of day students will have to be greatly enlarged. Dealing with the training of specialists, the suggestion was made that the technical institutes in our great university towns should each specialise one side of their teaching to the extent that it would not be necessary to repeat it in other university towns, but that it could be carried to the highest pitch in each institute, and that each institute, being recognised by other local universities as regards the acceptance and reception of their students in these special branches, there would be an enormous advantage for the universities, and a vast economy of teaching power. "What a magnificent and inspiring sight is the contemplation of these thousands of students who utilise this college," said Lord Rosebery towards the end of his address. "They come, not forced, to education, as is the case in so many of our class of gentle birth, but after a day's hard work, determined, whatever their stress or fatigue may be, to utilise their evenings for the raising of their minds and the perfecting of their methods. There is no more encouraging symptom in any community than this, and if we can even contemplate the possibility of a nation in the main composed of such youths, the nation will have nothing to fear in the long run. It is on its honest and strenuous youth that every nation depends, and youth such as that, determined and resolute on its own perfection and its own efficiency, is the surest sign of the health and strength of a country."

SOCIETIES AND ACADEMIES.

London.

Royal Society, June 4.—"The Electrical Qualities of Porcelain, with Special Reference to Dielectric Losses." By Dr. H. F. **Haworth.** Communicated by Prof. W. E. Ayrton, F.R.S.

This research was undertaken to determine some of the electrical qualities of porcelain, and their variations with respect to potential, temperature, and time. The electrical properties investigated, and the results briefly stated, are as follows:—

A. Capacity Measurements.

(1) The rate of charge of a porcelain condenser.

The rate of charge is comparatively slow; practically the porcelain is fully charged in one minute, if we take the first galvanometer swing as a measure of the capacity.

(2) The charge of a porcelain condenser as a function of the potential.

For potentials up to 1200 volts the charge was directly proportional to the potential, if the potential changes were made slow enough.

(3) The influence of sudden cyclical changes of potential on the charge of a porcelain condenser.

If the potential changes were made rapidly the charge was not quite proportional to the potential. A lagging effect was shown, indicating a loss in the dielectric.

(4) The dielectric constant, measured after one minute's electrification, varied with the temperature according to the following laws:—

Between 0° and 30° C., $C_t = C_0 (1 + 0{\cdot}00223t + 0{\cdot}0005t^2)$.
Between 30° and 100° C., $C_{t1} = C_{t2} . e^{0{\cdot}0264(t_1 - t_2)}$.

The dielectric constant at 20° C. was 8·95.

B. Conductivity Measurements.

(5) The apparent conductivity of porcelain, as measured by the ratio of current to potential, varies with the applied potential and the duration of the application. The dielectric polarises, or generates a back E.M.F., when a potential difference is applied to it. The conducting mechanism shows viscosity.

(6) The apparent conductivity of porcelain, measured after one minute's electrification, increases with the temperature according to the following law:—

$$\gamma_{t_1} = \gamma_{t_2} . e^{0{\cdot}090337(t_1 - t_2)}.$$

The specific conductivity at 20° C. is $0{\cdot}2624 \times 10^{-13}$ mhos per centimetre cube.

C. Dielectric Loss Measurements.

(7) The dielectric loss varies as the 1·74th power of the applied voltage, and is independent of the time of the cycle.

The dielectric losses at high potentials, and reasonable frequencies, may be termed hysteretic (*i.e.* independent of the time of the cycle of electrification). At very slow frequencies the loss is mainly C^2R loss, and this shows viscosity effects; but these losses are swamped at working frequencies by the dielectric hysteresis.

The dielectric loss was measured by the difference of temperature which could be maintained by the central surface of the porcelain plate above atmospheric temperature. This temperature difference being only a few degrees, it follows from Newton's laws of cooling that the heat lost is proportional to this difference, and as the heat lost is equal to the heat gained, if the temperature is constant, a thermopile placed with one end in contact with the porcelain will generate an E.M.F. which is directly proportional to the dielectric loss. This E.M.F. was measured by connecting the thermopile to a low-resistance galvanometer, and noting the direct and reversed deflections to eliminate the effect of local E.M.F.'s, &c. The losses were first measured at constant frequency of fifty per second, with pressures up to 38,000 volts (R.M.S.), and were then determined at constant pressure, 30,000 volts R.M.S., and for frequencies between 15·8 and 200.

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